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(54) **Compression joints**

(57) A compression joint of the kind for producing a fluid-tight joint by means of a simple push fit connection, including an O-ring (16) and a metal ferrule (20) through which a tube can be push fitted.

The metal ferrule (20) is a split ring made of pressed metal plate with a plurality of inclined tab portions (22) which engage a tapered internal surface (34) of a retaining cap or sleeve (26). Withdrawal of the pipe is prevented by interaction of the tab portions (22) with the tapered internal surface (34), which causes the ferrule to contract about the pipe outer surface and hold the pipe in position.

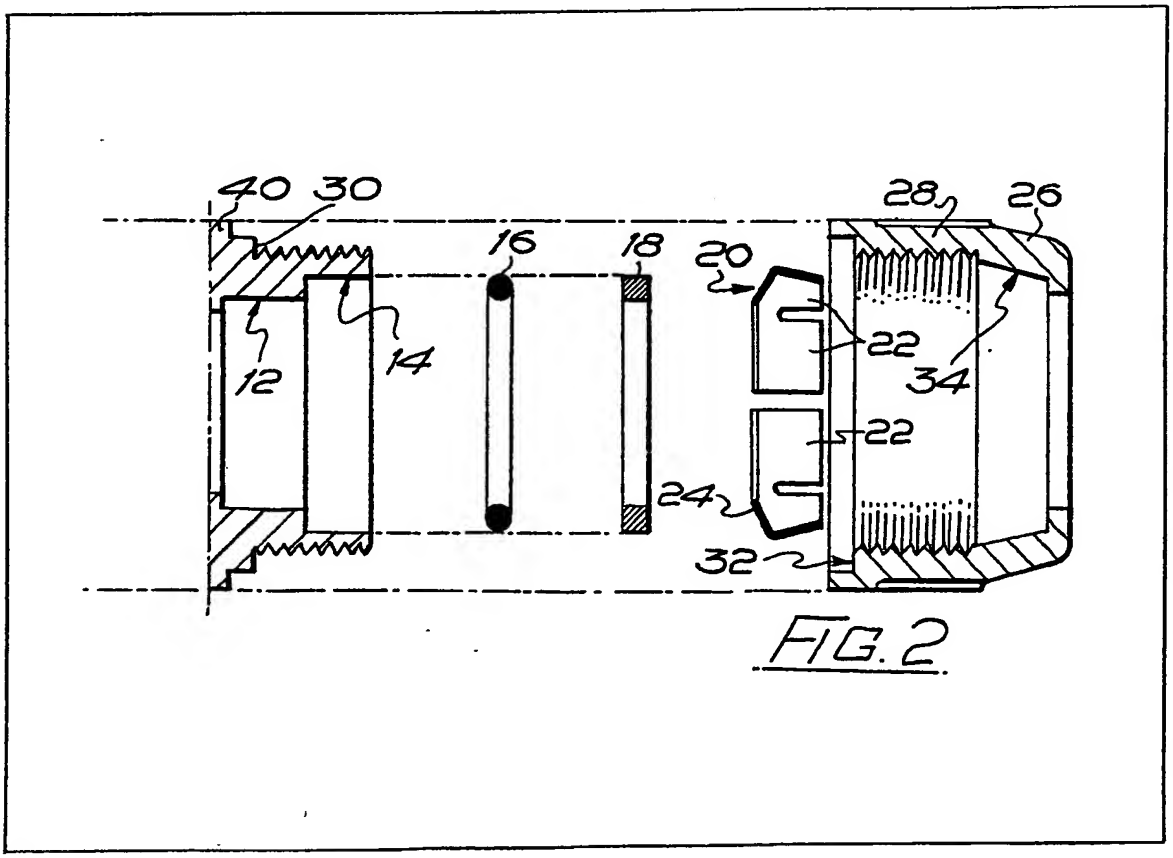

FIG. 2

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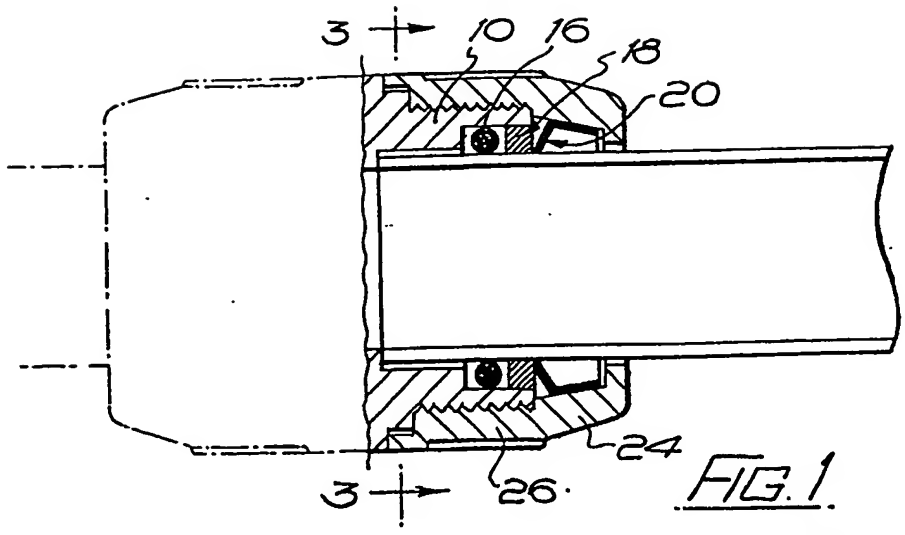

FIG. 1.

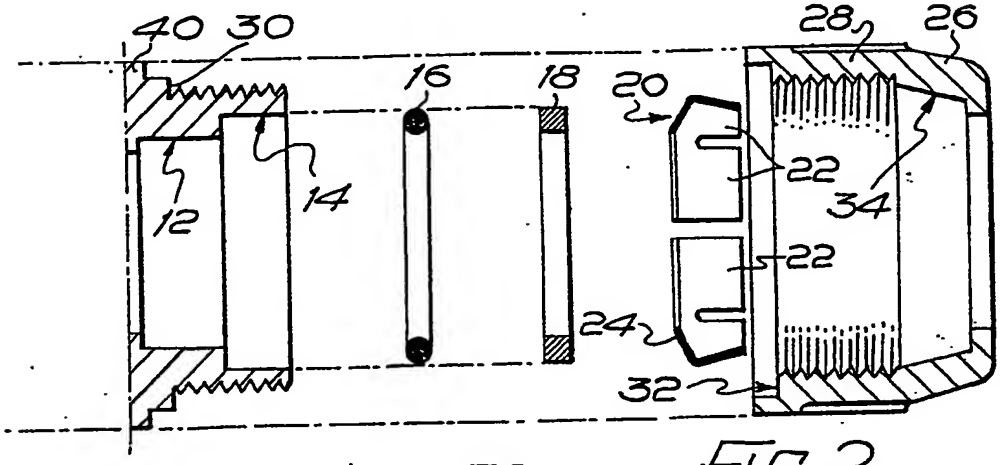

FIG. 2

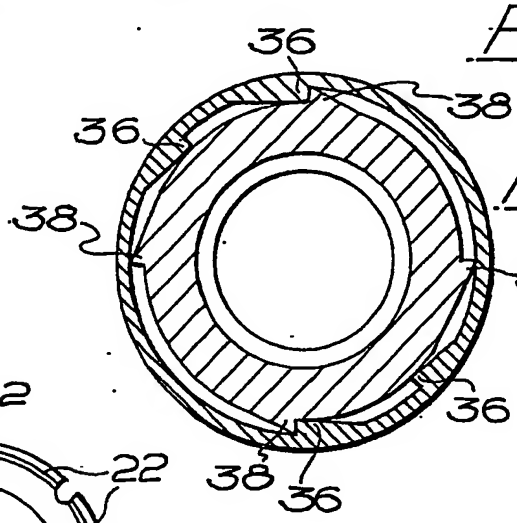

FIG. 3

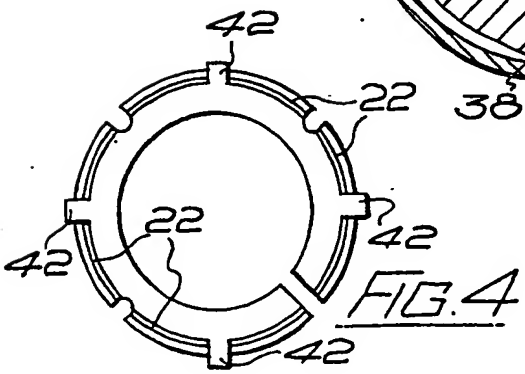

FIG. 4

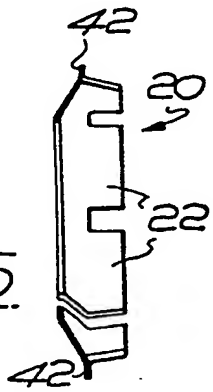

FIG. 5

SPECIFICATION
Compression joints

The invention relates to compression joints of the kind for producing a leak-proof seal on a tube or tubular connecting piece, for example a tubular connecting piece on a water tap or valve, and in particular to joints of this kind by which there can be obtained a fluid-tight joint by means of a simple push fit connection. Such joints are becoming increasingly more popular, for example when used in the installation of domestic water supply systems, because of the ease and speed with which they can be used and the fact that they can be installed, if required, in positions where it would be difficult if not impossible to use tools to tighten some other kind of joint.

The object of the invention is to provide a compression joint of the kind referred to of very simple construction and one which can be produced at very low cost.

According to the invention, there is provided a compression joint including a bodypart having a bore portion for the reception of an O-ring and a retaining cap or sleeve having a tapered internal surface within which is received a metal ferrule, the ferrule being formed as a split ring with a plurality of tab portions which incline inwardly from the outer periphery of a dished ring portion, said tab portions engaging the tapered internal surface of the retaining cap or sleeve, the arrangement being such that when the joint has been assembled the dished ring portion of the metal ferrule provides an interference fit for a tube or tubular connecting piece with which the joint is to be used, whereby the entry of said tube or tubular connection piece into the joint is allowed by the inward displacement of the ferrule by said tube or tubular connecting piece concerned but the subsequent extraction of said tube or tubular connecting piece is prevented by the tab portions of the ferrule riding down the tapered internal surface of the retaining cap or sleeve so that this causes the dished ring portion of the ferrule to contract and to bite into the surface of said tube or tubular connecting piece. A washer will preferably be provided to retain the O-ring in position in the bore portion of the body in which it is located.

In order that the invention may be fully understood and readily carried into effect, the same will now be described, by way of example only, with reference to the accompanying drawings, of which:—

Fig. 1 is a view of a double ended compression joint embodying the invention, the joint being shown partly in longitudinal section,

Fig. 2 is an exploded view thereof,

Fig. 3 is a sectional view on the line 3—3 in Fig. 1, and

Figs. 4 and 5 are respective end and sectional views of a modified form of component which will be referred to.

Referring now to the drawings, the double ended compression joint there illustrated is the same at both ends. The joint at one end only, the right hand end shown in section in Fig. 1, will therefore be described. This includes a body part 10 with stepped bore portions 12 and 14 (see Fig. 2). In the assembled joint the bore portion 14 forms a groove for the reception of an O-ring 16, the O-ring being retained in position by a washer 18. When the joint is in use, a tube or tubular connecting piece with which the joint is used extends through the O-ring and into the bore portion 12 as shown, the O-ring performing a leak-proof seal function.

The joint also includes a ferrule 20 made of pressed metal plate which, as best seen in Fig. 2, is formed as a split ring with a plurality of inclined tab portions 22 which incline inwardly from the outer periphery of a dished ring portion 24. The metal ferrule is located in position, with its dished ring portion adjacent the washer 18, by means of a retaining cap or sleeve 26 which has an internally screwthreaded skirt portion 28 engaging a screwthreaded portion of the body part. Said body part is provided with an abutment surface 30 against which an internal shoulder 32 of the skirt portion of the retaining cap or sleeve can abut when fully tightened. The inclined tab portions 22 of the metal ferrule 20 engage a similarly tapered internal surface 34 of the retaining cap or sleeve.

The arrangement is such that when the fitment has been fully assembled as shown in Fig. 1, the dished ring portion of the metal ferrule provides an interference fit for the tube or tubular connecting piece which is to be entered into the fitment. However, it will be understood that because the metal ferrule can be displaced inwardly by a tube or tubular connecting piece being entered into the fitment, the ferrule can expand slightly to allow the entry of said tube or tubular connecting piece concerned but will prevent its subsequent extraction. Indeed, an outwards pull, effected manually, causes the tab portions 22 to ride down the tapered internal surface 34 of the retaining cap or sleeve so that this causes the dished ring portion of the ferrule to contract and to bite into the surface of the tube or tubular connecting piece concerned. This then produces a very strong mechanical connection. However, it has been found that the amount of inward crushing of the ferrule onto the surface of the tube or tubular connecting piece concerned has not been sufficient to damage the tube or the ferrule. Consequently, it is found that the component parts of the joint and the tube itself can be re-used. (It will be understood that the design of the fitment is such that it can be fully assembled and tightened at the factory and that when it is used there can be obtained a fluid-tight joint by means of a simple push fit connection as described above. However, it is possible to dismantle the fitment when required by removing the retaining cap or sleeve.).

The joint illustrated in the drawings is provided with safety means to guard against the mechanical connection becoming slackened during service (which otherwise could happen if the joint is subjected to vibration or water hammer or even to fluctuations in the temperature of water

flowing through a water system in which the joint is used). Said safety means are constituted by a plurality of ratchet elements 36 formed within the skirt portion of the retaining cap or sleeve at its end remote from the tapered bore portion, said ratchet elements being capable of co-operating with a plurality of complementary ratchet stops 38 formed on the body part adjacent a central abutment flange 40. It will be seen that the width of the ratchet elements, that is to say their width axially of the joint, is relatively small, and the arrangement is such that the ratchet elements engage the ratchet stops (and this is of course allowed by resilient deformation of the skirt portion of the retaining cap or sleeve) during only the final part of the screwthreaded connection of the retaining cap or sleeve on the body part. The co-operating surfaces of the ratchet elements and ratchet stops are shown to be disposed in planes containing the axis of the joint. However, if the fitment is to be capable of being dismantled fairly easily these surfaces may be suitably inclined and it will be understood that the torque required to unscrew the retaining cap or sleeve will be dependent upon the inclination of the co-operating surfaces referred to and can be determined by trial and experiment.

Referring now to Figs. 4 and 5, these illustrate a modified form of ferrule 20 which has again been made as a pressing from metal plate and has a plurality of inclined tab portions 22 which incline inwardly from the outer periphery of a dished ring portion 24. However, in this case, the ferrule is in addition provided with a plurality of tab portions 42 for the purpose of facilitating manufacture. When this modified form of ferrule is used, the interior of the retaining cap or sleeve 26 will of course be provided with corresponding recesses.

Various other modifications may be made. For example, the joint need not necessarily be provided with safety means to guard against the mechanical connection becoming slackened during service. The retaining cap or sleeve can be tightened sufficiently on the body part before the assembled joint leaves the factory that inadvertent slackening is most unlikely to occur.

Although in the illustrated embodiment the body part is shown to be double ended and forming the body part of two such joints whereby two lengths of tube may be connected together end to end, the body part of the joint (that is to say one half of the body part illustrated in the drawing) may be formed integrally with some kind of fitting to which a tube or tubular connecting piece is to be connected.

CLAIMS

1. A compression joint including a body part having a bore portion for the reception of an O-ring and a retaining cap or sleeve having a tapered internal surface within which is received a metal ferrule, the ferrule being formed as a split ring with a plurality of tab portions which incline inwardly from the outer periphery of a dished ring portion, said tab portion engaging the tapered internal surface of the retaining cap or sleeve, the arrangement being such that when the joint has been assembled the dished ring portion of the metal ferrule provides an interference fit for a tube or tubular connecting piece with which the joint is to be used, whereby the entry of said tube or tubular connecting piece into the joint is allowed by the inward displacement of the ferrule by said tube or tubular connecting piece concerned but the subsequent extraction of said tube or tubular connecting piece is prevented by the tab portions of the ferrule riding down the tapered internal surface of the retaining cap or sleeve so that this causes the dished ring portion of the ferrule to contract and to bite into the surface of said tube or tubular connecting piece.

2. A compression joint according to claim 1, in which a washer is provided to retain the O-ring in position in the bore portion of the body in which it is located.

3. A compression joint constructed and arranged substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

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